PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in and relating to Coating Compositions

We, INDUSTRIAL METAL PROTECTIVES, INC., a Delaware corporation, of 900, Market Street, New Castle County, Wilmington, Delaware, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

The present invention concerns an improved protective coating composition for ferrous and non-ferrous metals and their alloys and is also directed to a method of making such protective coating The invention has proved particularly successful in connection with protective coatings for iron, aluminium, and alloys thereof.

It is an object of this invention to provide a protective coating for metals which are extremely durable and can be applied in a simple and inexpensive manner.

It is another object of this invention to provide a protective coating for metals and their alloys which coating will be of a fast drying character so as to allow a great output within a minimum of time.

With these and other objects in view, the present invention consists of a coating composition for protecting the surfaces of metals and their alloys, which includes a low-acid resin having an acid number of or below 90, drying oil, a solvent preferably selected from the group consisting of Xylol, Toluol, Naphtha, Mineral Spirits and Petroleum Solvents, drier, and zinc dust having an average particle size of preferably not more than 3 microns, at least 90% of which is capable of passing through a United States Standard 400 mesh sieve.

The invention also includes a method of protectively coating metals or alloys thereof, which comprises the steps of mixing at room temperature a solution of low-acid resin, having an acid number of or below 90, drying oil, solvent, cobalt and lead driers, adding zinc dust, of an average particle size of preferably not more than 3 microns, at least 90% of which is capable to pass through a United States Standard 400 mesh sieve applying said composition to the article to be coated, and drying the thus applied coating.

While the invention may be carried out in numerous ways, it will be described in connection with methods which have been found most suitable.

More specifically, to make up a coating composition according to the invention, there is mixed at room temperature a solution of a low-acid resin, drying oil, solvent, and metallic drier whereupon is added zinc dust the grain size of which is so small that at least 90% of it passes through a United States Standard 400 mesh sieve, but which preferably averages three microns or smaller. After these ingredients have been thoroughly mixed, the composition is ready for application to the article to be coated. This can be carried out either by spraying, brushing, dipping, or in any other convenient manner. The first applied coating is then dried, either air-dried or by application of heat.

It has been found that after four hours of air-drying, the coating is hard enough to allow baking and shipping of the articles. After a drying time of twelve hours the coating has acquired its final hardness which is materially greater than the hardness of coatings heretofore produced. If the production is to be speeded up, it is advisable to use forced drying. It should be noted, however, that the final coating obtained in this manner is generally not superior to a coating finished by air-drying.

Anti-corrosion coatings or primers have customarily been baked, and customarily such zinc base coatings must have additional treatments to render themselves satisfactory for the application of finished coatings to

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avoid ultimate destruction of the finished coats by the primer coat or the formation of bubbles, lumps, etc. under the finish coat.

In contrast thereto, the coating, according to the present invention, when used as a primer coat, has developed the unexpected property of permitting application of the undercoat after a few minutes of air-drying on the primer, without any further treatment of the primer. It has also been discovered that it is possible to bake both the primer coat and the finished coat simultaneously, thereby eliminating one baking and a large amount of expensive handling of mass production items on conveyor lines.

The finished coat or overcoat may consist of enamel, wrinkle finishes or any of the industrial finishes. After a short time required for the drying of the anti-corrosion undercoat, the overcoat can be directly applied and both coatings simultaneously baked. In this manner great economy is obtained where mass production is involved, as for instance in connection with the manufacture of ironers, washing machines, shower stalls, metal furniture, plumbing fixtures such as bath tubs, and the like.

The baking may be carried out at a temperature of 450° F., the preferred temperature being in the neighbourhood of 350° F. In the latter case, a drying time of about one hour will suffice; if drying is carried out with infra-red light, the heating time may be cut down to fifteen minutes.

The low-acid resins operative for the process and products of this invention are those having an acid number of, or below, 90. For instance, urea formaldehyde resins, melamine formaldehyde resins, phenol formaldehyde resins, alkyd resins, ester gums, dammar gums, are among those found satisfactory. These resins are preferably used in the form of a 50 to 60 per cent solution.

All drying oils showed good results. Oiticica oil, tung oil, dehydrated castor oil, linseed oil, raw or blown, and perilla oil, for instance, are operative.

Xylol, toluol, naphtha, mineral spirits, and petroleum solvents are the solvents preferred for the compositions of this invention; however, other aromatic and aliphatic solvents can be used.

As the drier, a mixture of cobalt and lead naphthenates and/or a mixture of cobalt and lead linoleates, in the form of a 4% solution or its equivalent, have been found satisfactory. A part of these driers may also be replaced by the corresponding manganese salts.

The following proportions of the ingredients were found to give satisfactory results:

60 to 70 fl. ozs.	..	Low-acid Resin
Up to 10 fl. ozs.	..	Drying Oil
16 to 24 fl. ozs.	..	Solvent
½ fl. oz.	..	Cobalt Drier
½ fl. oz.	..	Lead Drier
16 to 20 lbs.	..	Zinc Dust

In the following, a few examples are given for formulas suitable for the coating of this invention:

EXAMPLE I

64 fl. ozs.	..	Phenol Formaldehyde Resin
8 fl. ozs.	..	Raw Linseed Oil
16 fl. ozs.	..	Mineral Spirits
½ fl. oz.	..	Cobalt Linoleate
½ fl. oz.	..	Lead Linoleate
20 lbs.	..	Zinc Dust

The composition is prepared by mixing the liquid ingredients together at room temperature. To this mixture, the zinc dust is added slowly with constant agitation until a smooth homogeneous mixture is obtained. There will be a slight foaming during the initial mixing due to the reaction of the zinc and the acids present in the resins and the oils. This action ceases in a few minutes and is in no way detrimental to the final composition. This mixture yields one gallon of the coating composition.

EXAMPLE II

68 fl. ozs.	..	Phenol Formaldehyde Resin
20 fl. ozs.	..	Mineral Spirits
1 fl. oz.	..	Lead Naphthenate
18 lbs.	..	Zinc Dust

EXAMPLE III

64 fl. ozs.	..	Alkyd Resin
8 fl. ozs.	..	Oiticica Oil
16 fl. ozs.	..	VMP Naphtha
½ fl. oz	..	Cobalt Linoleate
½ fl. oz.	..	Lead Naphthenate
20 lbs.	..	Zinc Dust

EXAMPLE IV

70 fl. ozs.	..	Alkyd Resin
18 fl. ozs.	..	Xylol
1 fl. oz.	..	Lead Linoleate
18 lbs.	..	Zinc Dust

EXAMPLE V

64 fl ozs.	..	Phenol Formaldehyde Resin
6 fl. ozs.	..	Perilla Oil
18 fl. ozs.	..	Stoddard Solvent (a petroleum fractionation product with a cyclic, plain or mixed chain and having a boiling point of 300–310 (initial) and an end boiling point of 370–390 Gulf Oil Co.)
½ fl. oz.	..	Cobalt Naphthenate
½ fl. oz.	..	Lead Linoleate
19½ lbs.	..	Zinc Dust

EXAMPLE VI

66 fl. ozs.	..	Alkyd Resin
2 fl. ozs.	..	Dehydrated Castor Oil
20 fl. ozs.	..	Petroleum Solvent (flash point 104° F. or higher)
½ fl. oz.	..	Cobalt Naphthenate
½ fl. oz.	..	Lead Linoleate
18½ lbs.	..	Zinc Dust

EXAMPLE VII

67 fl. ozs.	..	Phenol Formaldehyde Resin
1 fl. oz.	..	Linseed Oil (blown)
20 fl. ozs.	..	½ : ½ Toluol and Mineral Spirits
½ fl. oz.	..	Cobalt Naphthenate
½ fl. oz.	..	Lead Naphthenate
20 lbs.	..	Zinc Dust

All of the above mixtures were applied to the articles to be coated and then allowed to air-dry, or to air-dry for about ten minutes and then baked as described. The coatings obtained therefrom were extremely hard and durable. The coatings on the articles were not affected by rain, salt water or the like which proves the excellent protective quality of the new coatings.

The production of these compositions is simple and fast and does not require any skilled labour. An important factor in the production is the possibility of working without any heating step whatever, since even the drying may be, and preferably is, carried out at room temperature if time allows.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:

1. A coating composition for protecting the surfaces of metals and their alloys, which includes a low-acid resin having an acid number of or below 90, drying oil, a solvent, preferably selected from the group consisting of Xylol, Toluol, Naphtha, Mineral Spirits and Petroleum Solvents, drier, and zinc dust having an average particle size of preferably not more than 3 microns, at least 90% of which is capable of passing through a United States Standard 400 mesh sieve.

2. A composition according to Claim 1, in which the low-acid resin solution has a concentration ranging from 50 to 60 per cent.

3. A composition according to Claims 1 and 2, in which the coating composition comprises from 60 to 70 fluid ounces of resin.

4. A composition according to Claim 1, in which the drying oil is present in the quantity up to 10 fluid ounces of drying oil.

5. A composition according to any of Claims 1 to 4, in which the solvent is selected from the group consisting of xylol, toluol, naphtha, mineral spirits and petroleum solvents.

6. A composition according to Claims 3, 4 or 5, which includes 16 to 24 fluid ounces of a solvent.

7. A composition according to any of Claims 1 to 6, in which the drier is selected from the group consisting of lead linoleate and lead naphthenate.

8. A composition according to Claim 3 and any of Claims 4 to 7, which includes ½ fluid ounce of lead drier and 20 pounds of zinc dust.

9. A coating composition according to Claim 2, which includes 64 fluid ounces of phenol formaldehyde resin, 8 raw fluid ounces of linseed oil, 16 fluid ounces of mineral spirits, ½ fluid ounce of cobalt linoleate, ½ fluid ounce of lead linoleate and 20 pounds of zinc dust.

10. A composition according to Claim 2, which includes 68 fluid ounces of phenol formaldehyde resin, 20 fluid ounces of mineral spirits, 1 fluid ounce of lead naphthenate, and 18 pounds of zinc dust.

11. A composition according to Claim 2, which includes 64 fluid ounces of alkyd resin, 8 fluid ounces of oiticica oil, 16 fluid ounces of VMP naphtha, ½ fluid ounce of cobalt linoleate, ½ fluid ounce of lead naphthenate, and 20 pounds of zinc dust.

12. A composition according to Claim 2, which includes 70 fluid ounces of alkyd resin, 18 fluid ounces of xylol, 1 fluid ounce of lead linoleate, and 18 pounds of zinc dust.

13. A composition according to Claim 2, which includes 64 fluid ounces of phenol formaldehyde resin, 6 fluid ounces of perilla oil, 18 fluid ounces Stoddard solvent (Gulf Oil Co.), ½ fluid ounce of cobalt naphthenate, ½ fluid ounce of lead linoleate, and 19½ pounds of zinc dust.

14. A composition according to Claim 2, which includes 66 fluid ounces of alkyd resin, 2 fluid ounces of dehydrated castor oil, 20 fluid ounces of petroleum solvent (flash point 104° F. or higher), ½ fluid ounce cobalt naphthenate, and 18½ pounds of zinc dust.

15. A composition according to Claim 2, which includes 67 fluid ounces of phenol formaldehyde resin, 1 fluid ounce of linseed oil (blown), 20 fluid ounces of a mixture of equal parts of toluol and mineral spirits, ½ fluid ounce of cobalt naphthenate, ½ fluid ounce of lead naphthenate, and 20 pounds of zinc dust.

16. A composition according to any of Claims 1 to 15, which includes an overcoat of enamel, lacquer, wrinkle finish or any similar industrial finish.

17. A method of protectively coating metals, which includes the steps of mixing at room temperature a solution of low-acid resin, having an acid number of or below 90,

drying oil, solvent, cobalt and lead driers, adding zinc dust, of an average particle size of preferably not more than 3 microns, at least 90% of which is capable to pass through a United States Standard 400 mesh sieve, applying said composition to the article to be coated, and drying the thus applied coating.

18. A method according to Claim 17, in which the applied coating is air-dried.

19. A method according to Claim 17, in which the applied coating is dried at a temperature of up to 450° F.

20. A method according to Claim 17, in which the coating is dried at approximately 350° F. for one hour.

21. A method according to Claim 17, in which the coating is baked by the application of infra-red light for about fifteen minutes.

22. A method according to any of Claims 17 to 21, in which a finishing coat of enamel, lacquer, wrinkle finish or the like is applied to the first or primary coat.

23. A method according to Claim 22, in which the primary coat and the finishing coat are simultaneously baked.

24. A method according to Claim 23, which includes the application of the finishing coat after the primary coat has air-dried to hardness.

25. A coating composition substantially as hereinabove described.

26. A method of protectively coating metals or alloys thereof, substantially as hereinabove described.

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